

Closed for mafia: Evidence from the removal of mafia firms on commercial property values

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Abstract

Using a sample of almost 7000 Italian municipalities from 2002 to 2019, we investigate how the removal of mafia-infiltrated firms affects commercial sale and rental prices. We conjecture that targeting mafia businesses leads to a reduction in local disamenities and an increase in the demand for commercial properties. Applying the latest methodologies based on difference-in-differences approaches, we show that antimafia policies aimed at confiscating and reassigning mafia firms have positive spillover effects on commercial real estate prices, driving values upward by about 4%. This is especially true for small-medium municipalities in mafia-ridden provinces. The evidence we provide supports the enforcement of antimafia policies with an economic content, as they pose a threat to criminal financial interests and curb the mafia influence in the market.

KEYWORDS

antimafia policy, commercial property values, difference-in-differences, firms, Italy, municipality data, organized crime

It is necessary to break the link between mafia groups and property owned, thereby undermining their economic power, and marking the boundary between the legal and illegal economy.

Pio La Torre

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1 | INTRODUCTION

Although organized crime is typically associated with aggression and violence, its underlying ideology is purely profit-oriented (Costa, 2010). Illicit practices such as intimidation, corruption, and fraud are only instrumental to an economic purpose, as shown by the increasing interest of criminal organizations in legitimate business ventures.¹ This is particularly true for mafia-type groups, whose pernicious infiltration in the legal economy has inflated their economic power, while maintaining an appearance of social legitimacy.

In this perspective, organized crime groups act as lobbies, thereby securing rent-seeking positions and unfair competitive advantages (Riccardi et al., 2016; Tanzi & Davoodi, 2001; Wolton, 2020). They also manage to exert their influence on other aspects of society, such as allocations of public funds, policy decisions, and market dynamics.² More generally, the literature suggests that organized crime presence has an increasingly harmful impact on local communities, pointing to three avenues that guarantee the acquisition as well as the preservation of mafia's territorial control. First, a distinctive feature of the mafia as a phenomenon that affects the local community consists in protection–extortion practices (Gambetta, 1993; Lavezzi, 2008). As highlighted by Vaccaro and Palazzo (2015), the Sicilian mafia has extorted protection money, that is, the so-called *pizzo*, for more than 150 years, forcibly coercing local business owners to regular illicit payments under the threat of vandalizing their activity if they happened to dare to refuse. Second, the creation of a dense network of relationships allows organized crime groups to sway the local political powers with deleterious repercussions on the socioeconomic fabric (Alesina et al., 2019; Buonanno et al., 2016; De Feo & De Luca, 2017). In this case, criminal organizations taint the institutional framework in which they operate, defining a set of accepted values and behaviors that end up prevailing on many levels (Acemoglu et al., 2020). Third, a rising stream of literature investigates the determinants of the expansion of organized crime groups beyond their original territories by infiltrating the legitimate economic activity (Arlacchi, 1983; Riccardi et al., 2016; Savona & Riccardi, 2015). Exploiting the labor market and political brokerage mechanisms, Dipoppa (2021) focuses on the abovementioned three avenues and concludes that criminal groups tend to expand where they can offer informal labor and where the demand for such labor is high.

The vicious cycle between political and economic power has been proved to undermine local development (Pinotti, 2015), and restrict economic growth (Detotto & Otranto, 2010). Governments have made considerable efforts to design legislative measures to deal with this phenomenon, among which the seizure of incomes and assets related to organized crime activities stands out. In this instance, Italy has one of the most advanced antimafia legislative frameworks since it combines a traditional prosecution strategy with a modern finance-related technique of crime control (Kilchling, 2014). The former aims to deter mafia members through strong penal punishment (e.g., through a differentiated prison regime ex-art. 41-bis of the Italian Prison Administration Act). The latter consists of patrimonial preventive measures to undermine organized crime profitability and thus discourage criminal activity itself.

Specifically, the so-called Rognoni-La Torre act (Law 646/1982) represented a milestone in the fight against criminal organizations. It provided for the confiscation and the reassignment of goods, properties, and firms whose owners have been involved in mafia-type associations. In a nutshell, this law establishes that the Court may order the preventive and conservative seizure of assets under reasonable suspicion that they result from illicit activities. Then, those assets—including firms—are reassigned to new purposes, mainly with the aim to restore local communities. This is consistent with Italian judge Giovanni Falcone's intuition that following the money trail may be the most effective strategy to defeat the mafia and its pernicious impact.³

¹Organized crime represents a worldwide socioeconomic threat that generates criminal proceeds equivalent to 3.6% of global gross domestic product (UNODC, 2011).

²On the topic of organized crime infiltration in Europe, see Savona et al. (2016). Mafia-type groups have also interfered in urban development planning, as evidenced by Chiodelli (2019).

³A key figure in the fight against the mafia, judge Giovanni Falcone led the Maxi Trial that convicted and incarcerated over 300 members of the Sicilian mafia and was murdered along with his wife and bodyguards on May 23, 1992.

In the present paper, we focus on the reassignment policy of mafia-infiltrated firms,⁴ which largely coincides with their exit from the market. More specifically, we empirically investigate the impact of the removal of mafia firms on commercial property values between 2002 and 2019 in a sample of almost 7000 Italian municipalities. We exploit the extensive data set provided by ANBSC (National Agency for the Administration and Destination of Seized and Confiscated Assets) on the reassignments of mafia firms as well as Italian Revenue Agency (*Agenzia delle Entrate*) data reporting commercial property sale and rental prices. Using a variety of estimation methods based on traditional as well as innovative difference-in-differences (DiD) techniques, we show that the removal of a mafia firm produces an increase in commercial real estate values of about 4%.

The contribution of this paper is threefold. First, we relate to the literature on the effect of organized crime infiltration on the economy (Barone & Narciso, 2015; V. Daniele & Marani, 2011; Galletta, 2017). However, since criminal organizations act illegally and tend to hide their operations, we use an indirect measurement of mafia infiltration proxying its empirical manifestation by removing mafia firms from the market. Our research also adds to the recent literature on the impact of economic-oriented antimafia policies (F. Calamunci & Drago, 2020; F. Calamunci et al., 2021; Ferrante, Fontana, et al., 2021; Ferrante, Reito, et al. 2021; Operti, 2018). Although it is widely recognized that asset reallocation may be beneficial from a socioeconomic perspective (Esposito & Ricci, 2015), the economic literature has focused primarily on the assessment of antimafia measures with political or punitive content.⁵ We conjecture that hitting the mafia through patrimonial measures is an effective way to dismantle its economic power. To the best of our knowledge, this is the first paper that explicitly investigates how antimafia policies targeted to infiltrated firms affect commercial property values. Lastly, we contribute to the urban literature concerned with how changes in disamenities (albeit latent ones) can affect intercity real estate values differentials (D. G. Pope & Pope, 2012; Roback, 1982; Rosen, 1974; Schmidt & Courant, 2006; Sivitanidou, 1995; Sivitanidou & Sivitanides, 1995a, 1995b). Our results complement this literature by proposing a new theoretical framework according to which organized crime infiltration through mafia firms distorts market competition. In this perspective, the enforcement of a policy aimed at removing these criminal actors from the legal economy may influence the demand for business spaces and, thus, commercial property sale and rental prices.

The remainder of the paper is as follows. Sections 2 and 3 outline the theoretical framework and the institutional setting, respectively, whereas Section 4 describes the data. Section 5 presents the empirical strategy. We discuss our findings in Section 6 and test their robustness and transmission mechanisms in Section 7. Section 8 concludes.

2 | THEORETICAL FRAMEWORK

Building on Rosen (1974) and Roback (1982), Sivitanidou (1995) and Sivitanidou and Sivitanides (1995b) provide a theoretical foundation for the influence of amenities on business rents within cities. More specifically, they extend the Rosen–Roback spatial equilibrium model by considering how supply-side factors (i.e., zoning constraints on commercial development) as well as demand-side ones, such as firm and worker amenities, affect commercial property values. Amenities include a wide array of pleasant attributes of an urban area⁶ and can account for differences in property prices and rents across cities and neighborhoods, as predicted in the traditional spatial equilibrium model (Roback, 1982; Rosen, 1974; Sivitanidou & Sivitanides, 1995a). Firm amenities feature easy access to input and output markets, proximity to transportation and business services, whereas worker amenities

⁴For this study, we use the expression mafia-infiltrated firm or mafia firm to indicate a firm connected with criminal organization members.

⁵An extensive strand of research has analyzed the impact of the dissolution of city councils for mafia infiltration (Law 221/1991) on the quality of local politicians (G. Daniele & Geys, 2015), allocation of municipal spending (Di Cataldo & Mastrococco, 2021) and public procurement performance (Ravenda et al., 2020). Scognamiglio (2018) examines how the legal practice of mafia members relocation affects crime and employment.

⁶Following the categorization proposed by Wilkinson (1973), these attributes can be “dwelling-specific” and “location-specific.” Firm and worker amenities belong to the latter category.

consist of high public-school quality, and proximity to shopping malls. Low crime rates, on the other hand, can be regarded as an amenity for both workers and firms (Sivitanidou & Sivitanides, 1995a).

More specifically, Sivitanidou (1995) postulates that in a multinodal metropolis setup, firms and workers are free to move across districts that differ in amenity and disamenity stock. Identical firms produce output under constant return to scale technology and incur costs associated with commercial space rent, labor wages, and productivity-enhancing amenities. Provided that perfect labor mobility equalizes wages across nodes, differentials in office-commercial-industrial rents depend on each area's amenity stock. As a result, high-amenity nodes will have higher equilibrium commercial rents than low-amenity urban areas. Estimates on the Greater Los Angeles area further validate this theoretical model, as Sivitanidou and Sivitanides (1995b) find empirical evidence that both firm and worker amenities significantly impact industrial rents with a positive sign. Within this framework, we conjecture that the outreach of organized crime can be interpreted as a latent disamenity that undermines and distorts the local economy, thereby reducing property values.

Most real estate research is limited to crime, without consideration of criminal organizations and their influence.⁷ An extensive empirical literature adopts hedonic price techniques to estimate the cost of crime at the estate or neighborhood level, confirming that living in areas characterized by high crime risk implies a detriment to the quality of life and thus negatively affects residential real estate prices (Cohen, 1990; Linden & Rockoff, 2008; Lynch & Rasmussen, 2001; J. C. Pope, 2008; Thaler, 1978). Housing values appear to be responsive particularly to violent offenses (Gibbons, 2004) and crimes that convey the feeling of declining neighborhood (Ihlanfeldt & Mayock, 2010), and tend to hit low-income areas more severely (Tita et al., 2006). D. G. Pope and Pope (2012) slightly differ from this strand of literature, conducting a zip-code level analysis on a national scale, and find that the drop in American crime of the 1990s led to a growth in housing prices.

Following this approach, we focus on organized crime, and more specifically, on how targeting mafia-infiltrated businesses affect commercial real estate values at the municipality level. Except for Battisti et al. (2019), who show that district-level housing prices and rents fall in response to the occurrence of mafia homicides, the urban property literature on the impact of organized crime remains scarce. Besides, to the best of our knowledge, no previous work addresses the influence of criminal organizations on nonresidential property values, even though commercial space rents and prices constitute an essential input cost for firms across various industries. Our results closely relate to Lens and Meltzer (2016), who use commercial property sales as a proxy for economic activity and find that crime impairs business prosperity in the New York city area. In our paper, the emphasis is on mafia-type organization in Italy.

Given the ability of criminal organizations to infiltrate legal markets, it is highly implausible for commercial property values to remain unaffected. It is well known that mafia-infiltrated firms engage in rent-seeking behavior and resort to illicit means, such as corruption of public officials, procurement fraud, and intimidation, through which they obtain economic advantages—for example, lower input prices, easier access to capital, and wage compression (Arlacchi, 1983, 2010; Caneppele & Martocchia, 2014; Mirenda et al., 2022). Other companies, thus, suffer a burden related to the unfair business advantages of their competitors.⁸ For instance, competing firms located in mafia-ridden contexts may face a higher average cost of credit (Bonaccorsi di Patti, 2009), fail to obtain foreign direct investments (V. Daniele & Marani, 2011), and miss productivity growth opportunities related to clustering and cooperation (Ganau & Rodríguez-Pose, 2018).

The removal of mafia businesses may therefore restore favorable market conditions creating a more competitive context. In this instance, Ferrante, Fontana et al. (2021) show that the judicial foreclosure of mafia

⁷For instance, Sivitanidou and Sivitanides (1995a, 1995b) include crime among worker disamenities, as high levels of crime translate into lower commercial property values within a certain urban area.

⁸The existence of these economic advantages is corroborated by the fact that mafia companies are put under a strain when operating within the law, as confirmed by their profitability and efficiency levels deteriorating (F. M. Calamunci, 2022), and most of them ending up in foreclosure (Ferrante, Fontana, et al., 2021).

firms leads to lower market concentration in the construction sector in Sicilian municipalities. Operti (2018) finds supporting evidence that the implementation of confiscation orders involving organized crime's economic assets is positively correlated with the number of new market entrants at the provincial level in Italy. From the arguments above, we conjecture that the removal of mafia firms may imply an increase in the demand for business spaces, translating into higher capital and rental values of commercial buildings in the municipality where the policy is enforced.

3 | INSTITUTIONAL SETTING

After World War II, the industrial development of the Italian economy saw organized crime groups gradually extending their criminal interests in various business sectors. The Italian legislative framework lacked specific tools to handle the infiltration of criminal organizations in the legal economy until the 1980s. On March 31, 1980, one of the leaders of the Communist party, Pio La Torre, and the then Minister of the Interior, Virginio Rognoni, presented an antimafia bill to the Chamber of Deputies. The law aimed at formally recognizing mafia-type associations and undermining their economic power through patrimonial measures, that is, the seizure and confiscation of incomes and properties of mafia members.

In retaliation for the tangible blow that this bill posed to their economic interests, *Cosa nostra* orchestrated the killing of Pio La Torre on April 30, 1982. This, however, coupled with another mafia murder, the assassination of the newly appointed prefect of Palermo, General Carlo Alberto Dalla Chiesa, on September 3, ultimately speeded up the bill's passage. The Rognoni-La Torre act was approved 10 days later and came into effect on September 29, 1982.

In the following years, the fragmentation and lack of systematic harmonization have led legislators to implement a complete reorganization of the regulations with the Antimafia Code (Legislative Decree 159) in 2011.⁹ Both pieces of legislation establish clear patrimonial measures aimed at the confiscation of properties owned by mafia members when there is evidence that they are the result of illegal activities.

The enforcement of these legislative actions is structured in two steps: (1) judicial, from the issue of the seizure decree to the first-degree confiscation; (2) administrative, from the first-degree confiscation to the definitive confiscation decree.

The first step is applicable by the Court upon the proposal of the Public Prosecutor's Office or the Police Authority. Authorities distinctively and autonomously decide each preventive measure after investigations prove that the assets are the result of illegal activities. The judge appoints an administrator who manages the assets and tries to transform them into legal entities, preserving their economic value while breaking all previous links with the criminal network.¹⁰ Following this instruction, the administrator manages firms' assets until the confiscation decree at the first level of the jurisdiction (*Decreto di Confisca di primo grado*) is promulgated, leading to the end of the judicial phase.

In the second step, the administration of the assets goes from the judicial authority to the National Agency, which must take care of the custody, preservation, and management of the assets seized during the entire procedure. With the definitive confiscation (*Decreto di Confisca di secondo grado*), assets are acquired as state property, free of charges and burdens. According to the specific procedures indicated in the Code (art. 48), at this stage, the National Agency establishes a new destination for the confiscated assets. In particular, formerly mafia-

⁹The Antimafia Code provides that, in the case of belonging to mafia association, both the procedure for ascertaining the associated crime and the process for the application of the preventive measure must be activated simultaneously (article 2-ter l. 575/65—now articles 20–22 Codice Antimafia).

¹⁰Once the preventive measure is activated, the formerly mafia-owned firms are not eliminated from the market but continue to exist under legal control. For a comprehensive examination of the legal framework and the economic implications of judicial administration see Donato et al. (2013) and F. M. Calamunci (2022).

owned firms that have been seized and confiscated can be (1) offered for rent to private and public companies only if there is a good chance of keeping the business running; (2) reassigned, under a bailment contract, to former employees of the confiscated company; (3) put up for sale to anyone interested in taking over the business; or (4) destined to foreclosure, in which case the proceeds go to the restoration of mafia victims.

Several difficulties prevent the effective implementation of the law. The reallocation of confiscated assets and firms may only appear on paper and not be implemented, at least not for many years or adequately, because of red tape or other forms of bureaucratic inefficiencies. For instance, the process of legal reconversion of mafia firms tends to be unsuccessful in most cases.¹¹ In fact, almost all the confiscated companies end up being sold or foreclosed (ANBSC, 2019). In this perspective, the policy enforcement can be equated with the removal from the market of mafia-infiltrated firms.

In many instances, the Italian institutional framework has been taken as a reference by other countries (Progetto ICARO, 2016; UNODC, 2014). Legislators around the world have resorted to similar legal instruments including asset freezing, seizure, and confiscation to deal with organized crime activities (UNODC, 2017). The importance of confiscating criminal assets, in line with the Italian model, and the diffusion of an antimafia culture, is spreading not only in Europe (European Commission, 2008, 2012; European Parliament, 2012) but also in Central and Latin America (Global Initiative, 2016) to protect the legitimate economy from organized crime infiltration. For example, Directive no. 42/2014/EU set up a process of harmonization of national rules concerning freezing and confiscation of instrumentalities and proceeds of crime, which has been finalized by Regulation no. 1805/2018, providing for the mutual recognition of the abovementioned patrimonial measures. The effort of public authorities, as well as that of grassroots antimafia associations, like *Libera*, has translated into awareness campaigns/initiatives to export the Italian model around the world, particularly in Albania, Argentina, and France.¹²

4 | DATA

The empirical analysis is based on a panel data set spanning from the second semester of 2002 to the first semester of 2019 and built using three main sources. First, data on seized and reassigned firms have been extracted from OpenRegio, the open-source online portal of the ANBSC.¹³ We use data on firms whose confiscation is final and are thus allocated to new uses (*Aziende destinate*). We focus on the last step of the policy, which mainly coincides with the removal of mafia firms from the market through the selling, the rental, or the foreclosure of business assets.¹⁴ In Figure 1, panel (a) reports the number of mafia-infiltrated firms targeted by the policy between 2002 and 2018, whereas panel (b) summarizes the sectorial distribution of these companies up to 2018, giving an overview of the sectors and markets infiltrated by organized crime. What emerges is that the outreach of organized crime in the legal economy is as widespread in the traditional sectors such as construction, transportation and logistics, retail, and wholesale, as in other industries, such as business services, personal services, hotels and restaurants, and healthcare.

Second, we use microaggregated level data on commercial property values provided by the Italian Observatory on the Real Estate (*Osservatorio del Mercato Immobiliare*—OMI), published by the Italian Revenue Agency. The Agency releases half-yearly reports on the average maximum and minimum sale and rental prices (€/m²) for all

¹¹Cabras and Meli (2017) provide some thriving exceptions of successfully reconverted mafia businesses.

¹²<https://aaprk.gov.al/en/cause-project/>, <https://www.libera.it/schede-1724-argentina-il-modello-italiano-per-beni-confiscati-alla-criminalita>, and <https://www.ilfattoquotidiano.it/2021/04/18/ora-anche-la-francia-ha-una-legge-per-luso-sociale-dei-beni-confiscati-alla-mafia-litalia-ci-ha-insegnato-che-cosi-si-cambia-la-mentalita/6164480/>

¹³Unfortunately, the data are disclosed by ANBSC anonymously and do not allow unique identification of companies, thus limiting the possibility of collecting information on the personal and financial profile of companies.

¹⁴As of July 2021, 1496 businesses have been confiscated and reassigned. Less than 1% of these firms have been transferred or rented; the remainder is either foreclosed or sold.

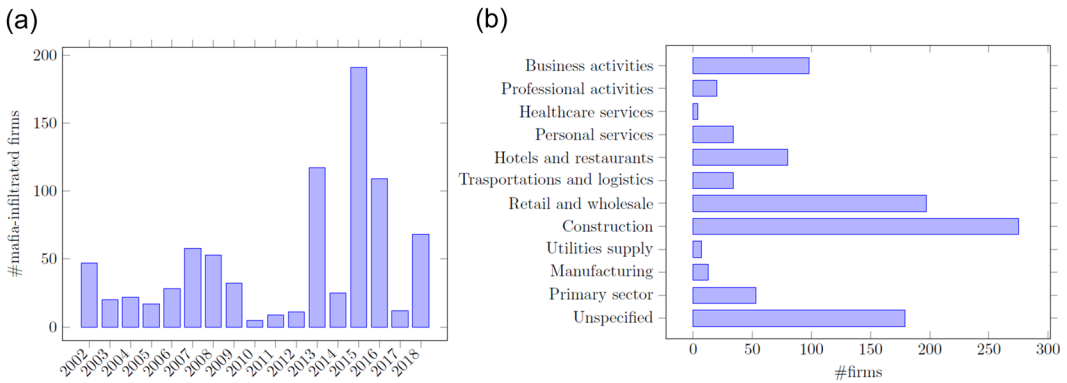


FIGURE 1 Number of seized and reassigned mafia firms between 2002 and 2018 (a) and sectorial distribution up to 2018 (b). *Source:* Our elaboration on ANBSC data. (a) Number of mafia-infiltrated firms and (b) mafia-infiltrated firms by sector.

microgeographical areas in Italy. More specifically, these areas are referred to as *OMI zones*, that is, continuous portions of territory at the municipal level, with homogeneous economic and socioenvironmental conditions, including urban planning, historical characteristics, and provision of services and urban infrastructures. The four main OMI zones we consider are B1, C1, D1, and E1, which refer, respectively, to the central, semicentral, peripheral, and suburban area within each city. OMI sale and rental prices are available for a variety of dwelling types that can be grouped into the following categories: (1) residential, (2) commercial, (3) tertiary, (4) productive, and (5) parking lots. We focus on the second category, and more specifically on free-standing shops and stores (*Negozi*). Commercial properties make up a considerable proportion of the urban real estate stock. In Italy, they amount to over 2.5 million units on the national territory and tend to be clustered in small municipalities (Agenzia delle Entrate, 2021). We take the average of the prices of the existing OMI zones that compose each city to obtain property values referring to the entire municipal area.¹⁵

Figure 2 displays how average prices (a) and rents (b) of retail business spaces varied across Italian municipalities during the first semester of 2019.

Third, we gather yearly municipality-level data from *Unioncamere-Infocamere* on active firms and firms' employees spanning 2002–2019 to provide further insights on the transmission mechanisms behind our findings (see Section 7).

5 | EMPIRICAL STRATEGY

The study exploits the plausibly exogenous shocks generated by the staggered adoption of confiscation and reassignment policies for mafia firms across municipalities to identify their impact on commercial property prices. Several facts support this strategy. As explained in Section 3, a committee of judges evaluates the specific case and enacts each final decree of confiscation; similarly, any provision of reassignment is assessed according to the Antimafia Code at different times. Additionally, following the pieces of evidence pointed out by the Corte dei Conti (2016), the time span between confiscation and reassignment could vary for every case due to the high variability in

¹⁵If, on the other hand, the removal of mafia-infiltrated firms also affected the supply of commercial properties, for instance inducing owners to put up business spaces for sale and rental, the positive effect on prices would be underestimated. Thus, the ramifications of our theoretical underpinnings would not change substantially.

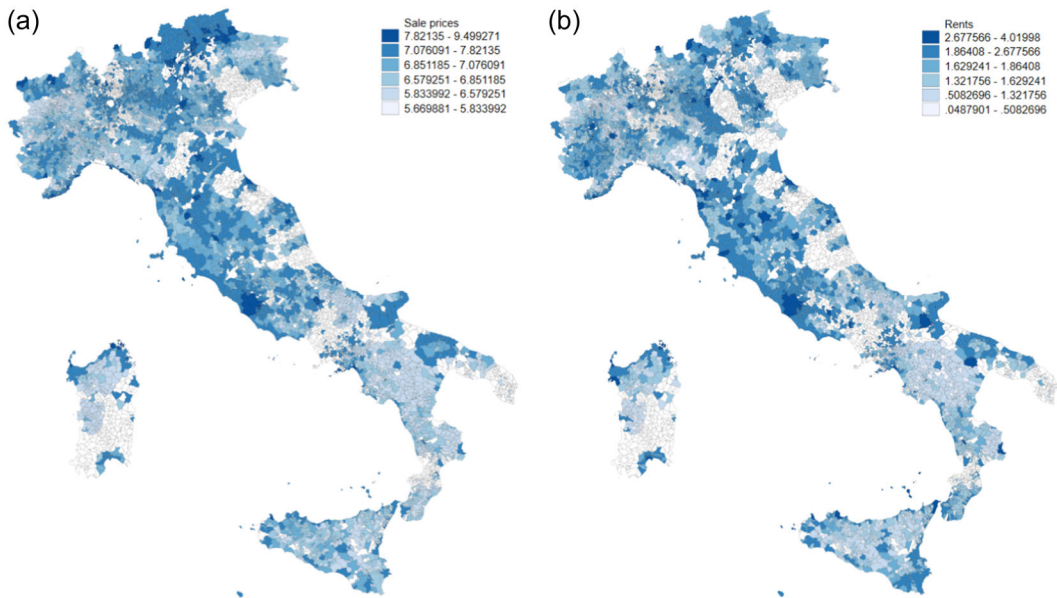


FIGURE 2 Average sale (a) and rental prices (b) of commercial dwellings in Italian municipalities in natural log of €/m². The first semester of 2019. *Source:* Our elaboration on Italian Revenue Agency data.

the disposition time across and within districts.¹⁶ Because of this high variability in the timing across municipalities (contingent to different judicial offices and judges), treatment timing is plausibly exogenous.

Our empirical design compares municipalities which are treated to municipalities which are not treated. We start estimating the most standard specification,

$$Y_{m,t} = \alpha_m + \beta Treated_{m,t} + \delta_t + \varepsilon_{m,t}, \quad (1)$$

where $Y_{m,t}$ is our dependent variable (either the natural logarithm of the average rent or sale price of commercial buildings), measured at the municipal level m ; $Treated_{m,t}$ is an indicator variable that is equal to 1 when $t > E_m$, where E_m is the semester when the municipality is first treated; α_m and δ_t indicate, respectively, municipality and time (at semester level) fixed effects. The parameter β identifies the “treatment effect” on our outcome variables, thus showing whether and how the removal of mafia firms from the market impacts the prices of commercial properties in the municipality where the antimafia policy has been enforced; $\varepsilon_{m,t}$ is the error term clustered at the municipality level.

We conjecture that the enforcement of the policy affects the economy of the entire municipality, with a positive externality on the commercial sector as a whole.¹⁷ To account for the same cities experiencing multiple confiscations over time, we only consider the effects of the first policy treatment, dropping all observations from the second reassignment onward.

¹⁶For a complete illustration of the Italian criminal justice system and its disposition time see Ministero della Giustizia and Direzione Generale di Statistica (2003), Coviello et al. (2015), and, in a different framework, Drago et al. (2020) who exploit variation in the disposition times with individual-level data.

¹⁷Although the disamenity generated by a mafia firm may be proportional to its size, ANBSC does not provide any information on it. However, our hypothesis is that any measure against mafia firms represents a signal of restoration of legality, regardless of the industry where reassigned mafia firms used to operate. Again, when disentangling the treatment by business sector, no clear pattern seems to emerge, which ultimately confirms that the final effect on commercial property values is due to the policy itself.

However, the implementation of a standard two-way fixed effects (TWFE) specification (Equation 1) may lay down a series of empirical challenges as outlined by a growing econometric literature (among others, Borusyak & Jaravel, 2017; Callaway & Sant'Anna, 2021; de Chaisemartin & d'Haultfoeuille, 2020; Goodman-Bacon, 2021). One of the main econometric issues pertains to the possible presence of bias in the case of heterogeneous treatment effects over time, since TWFE models with staggered adoption summarize the treatment effects in a single coefficient. More specifically, de Chaisemartin and d'Haultfoeuille (2020) show that, in calculating the regression coefficient, which is actually a weighted sum of the average treatment effects (ATEs) in each group and period, some ATEs may be assigned negative weights, leading to a biased coefficient estimate.¹⁸ Similarly, Sun and Abraham (2021) emphasize that, in the dynamic staggered settings, the coefficient on a given lead or lag can also be contaminated by effects from other periods.

In recent years, several alternative DiD estimation techniques have been provided to overcome these econometric challenges. Most of these alternative estimators are based on event study DiD setting that allows for dynamic treatment effects. In doing so, the new estimators modify the set of units that can act as effective comparison units in the estimation process.

Among these several possibilities, we apply the alternative estimator developed by de Chaisemartin et al. (2019), which is robust to heterogeneous or dynamic treatment effects, using the *did_multipligt* Stata command. Accordingly, we compare municipalities not-yet-treated in a specific time t and those treated for the first time in the same period. Hence, in a staggered design, the average of simple DiD estimations across all the municipality groups and semesters whose treatment changes from one semester to another outlines the instantaneous treatment effect. Instead, the weighted average cumulative effects of simple DiD estimations define the dynamic treatment effects, namely, we compute DiD comparing the evolution of the mean outcome between two consecutive semesters among municipalities whose treatment varies between the two semesters and municipalities whose treatment does not change.

Furthermore, econometric literature shows how difficult it is to assess the parallel trends assumption with the standard TWFE. In contrast with this one, the de Chaisemartin and d'Haultfoeuille estimator is not based on the constant treatment effect assumption, thus defining the testing for the plausibility of the parallel trends assumption, arguing that it leads to a more robust test of common trends. Hence, we test the parallel trends assumption generating "placebo estimators" that compare the outcome evolution of municipalities not treated with those that become treated, before the treatment status of the latter category changes.

6 | MAIN RESULTS

Table 1 shows the main results for the effect of the reassignment policy on the commercial sale and rental prices. We start by estimating the static TWFE model outlined in Equation (1). The results in columns (1) and (2) provide pieces of evidence that sale and rental prices significantly increase, respectively, by about 4.81% and 4.42%. The magnitude of our estimates is in line with that of some contributions on property values and crime. For instance, Tita et al. (2006) show that crime can lower house prices by 3.6% in low-income neighborhood. Lens and Meltzer (2016) find that the negative impact on commercial prices of crimes at a very close range may be between 2% and 6%. Furthermore, since criminal firms are key players in the local economy, the scale of the effect of their exit from the market is not surprising. Indeed, it is documented how their removal has significant spillovers as shown by several empirical works (F. Calamunci & Drago, 2020;

¹⁸Negative weights constitute an econometric issue because they are typically a cause of bias in the DiD regression estimates that could diverge from the true sign of the treatment effects. This is especially true in our setup when ATEs may be heterogeneous across municipalities and over semesters.

TABLE 1 Estimation results with two-way fixed effects (FEs)

| | (1) | (2) |
|---|-----------------------|-----------------------|
| | Sale | Rent |
| <i>Treated</i> | 0.0481*** (0.0177) | 0.0442*** (0.0167) |
| Time FEs | Yes | Yes |
| Municipality FEs | Yes | Yes |
| Observations | 150,594 | 142,048 |
| Number of municipalities | 6917 | 6555 |
| R ² | 0.9431 | 0.9189 |
| Mean of dependent variables | 6.8837 | 1.5904 |
| Standard deviation of dependent variables | 0.4134 | 0.4212 |
| % ATTs with negative weights | 24.37 | 24.40 |
| Sum of negative weights | -0.0026 | -0.0027 |
| $\underline{\sigma}_{fe}$ | 0.0378 | 0.0348 |
| σ_{fe} | 6.4008 | 5.5902 |

Notes: The dependent variables are the natural logarithm of the average commercial property sale and rental price for shops and stores. Standard errors (corrected for heteroskedasticity and clustered at the municipality level) are reported in parentheses. The symbols ***, **, and * indicate, respectively, that coefficients are statistically significant at the 1%, 5%, and 10% levels.

Abbreviation: ATTs, average treatment effects.

Mirenda et al., 2022; Transcrime, 2013) that support their economic importance in the market as well as anecdotal evidence.¹⁹

We then estimate the weights attached to each of the average treatment effects (ATTs) to compute the overall $\hat{\beta}_{fe}$ estimate.²⁰ We find that 76% are strictly positive and 24% are strictly negative (in both outcomes), giving rise to an amount of negative weights equal to -0.0026. The command also provides two diagnostic measures, $\underline{\sigma}_{fe}$ and σ_{fe} ,²¹ to assess the validity of the $\hat{\beta}_{fe}$ estimate to treatment heterogeneity across groups and over time. Both tests show how robust the estimator is if there is an unobserved degree of heterogeneity in the treatment effects across treated groups and time periods.

The results from these diagnostic tests are provided in Table 1. They correspond to the minimum value of the standard deviation needed for the real parameter to be zero, despite the presence of a statically significant effect of the reassignment policy. Specifically, $\underline{\sigma}_{fe}$ suggests that β_{fe} and the ATT may be of different signs if the standard deviation of the ATEs of the reassignment policy across treated municipalities and semester is above to 0.0378 and

¹⁹For example, Mirenda et al. (2022) show how criminal firms gain a real dominant market position in the construction sector, while De Simoni (2022) points out that infiltrated firms have higher revenues than legal businesses. Moreover, several cases highlight how criminal firms infiltrated key sectors of the local economic context, ranging from wholesale and retail (e.g., huge shopping center), construction empires, service activities (e.g., private clinics) to utility supply (e.g., gas distribution network). <https://www.ilfattoquotidiano.it/2015/03/12/ndrangheta-sequestrato-centro-commerciale-piu-grand-della-calabria/348309/amp/> https://bari.repubblica.it/cronaca/2022/04/23/news/mafia_a_bitonto_confiscato_patrimonio_da_20_milioni_a_54enne_legato_ai_clan_aveva_creato_unimpresa_edile-346570542/ <https://www.hwupgrade.it/forum/archive/index.php/t-1316946.html/> <https://www.impress.it/inchiesta/confisca-dei-beni-frutto-degli-investimenti-della-mafia-nelle-societa-del-gas/>

²⁰We use the *twowayfweights* command, developed by de Chaisemartin and d'Haultfoeuille (2020) and available in the STATA repository.

²¹This second measure is determined only if at least one of the weights is negative.

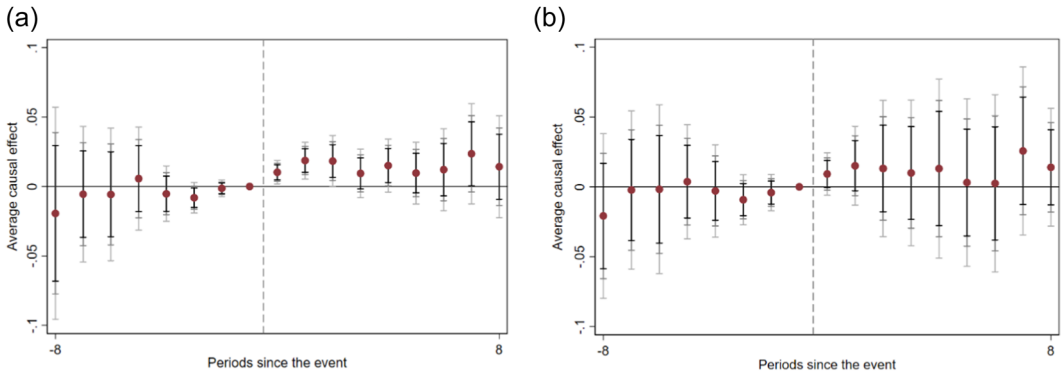


FIGURE 3 Event studies, using de Chaisemartin and d'Haultfoeuille (2020) methodology. The panels show the event study results, implemented through the estimator developed by de Chaisemartin and d'Haultfoeuille (2020). The dependent variables are the natural logarithm of the average commercial property sale (a) and rental (b) price for shops and stores. Coefficient estimates are provided together with the 90% (black), 95% (gray), and 99% (light gray) confidence intervals.

0.0348, respectively, for sale and rental prices; while σ_{fe} indicates that β_{fe} may be of an opposite sign than the ATEs of the reassignment policy in each municipality if the standard deviations of those effects are above to 6.4008 and 5.5902.

In the final step of the empirical analysis, we draw the results from our DiD design with the dynamic specification. We use the estimators developed by de Chaisemartin and d'Haultfoeuille (2020), which are robust to heterogeneous or dynamic treatment effects. Figure 3, panels (a) and (b), plot the pretrend estimates obtained from the regression equation and the dynamic treatment effects for eight semesters before and after the reassignment of firms. The figures validate the empirical design: the pretrend coefficients are small and not statistically significant. Turning to the dynamic treatment effects estimates, we find that the dynamic effects start to grow directly after the treatment occurs. The panels confirm the increasing pattern.

6.1 | Alternative estimators

To corroborate our findings, here we check the robustness of our baseline results using alternative estimation methods. We adopt the conventional event study methodology, which involves the estimation of a version of Equation (1) via ordinary least squares (OLS), where a complete set of semester dummies replaces the dummy treatment for each semester before and after the treatment. The semester before the treatment takes place is our reference category.

Figure 4 reports the results. In panel (a), we show the semester-on-semester variation in the sale price, that is, the point estimates of each eight pre/posttreatment semesters with confidence intervals at 90%, 95%, and 99%. In the semesters before the treatment, we do not find any statistically significant difference. From the policy entry onwards, the rent price increases for the treated municipalities. The same considerations apply to rental prices (panel b).

Since the specialized literature has not yet agreed on an established method for the new DiD estimator developed, following Baker et al. (2021), we additionally test the robustness of inferences through another alternative estimation. We use the Sun and Abraham (2021) method,²² which investigates the presence of pretrends and the dynamic evolution of the treatment effect, considering the treatment effects heterogeneity. In

²²We run the *eventstudyinteract* package written by Sun and Abraham (2021) that implements the IW estimator for an event study, using a restricted balanced data set.

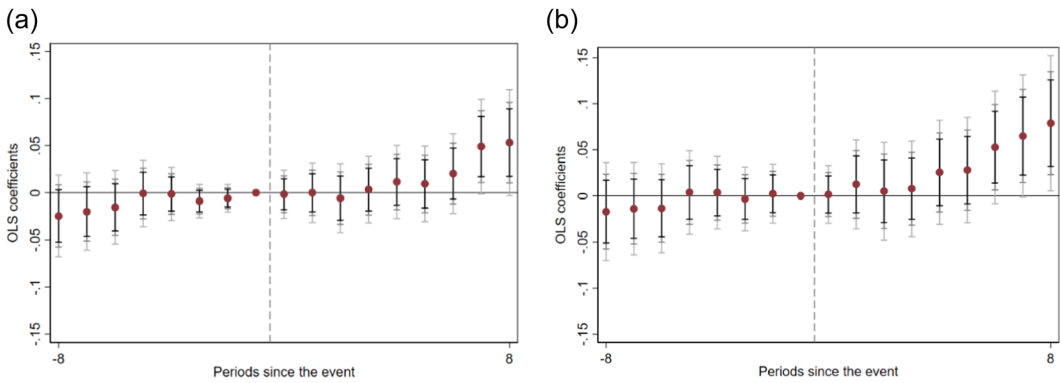


FIGURE 4 Event studies, using TWFE OLS estimation. *Notes:* The panels show the event study results using TWFE OLS estimation. The dependent variables are the natural logarithm of the average commercial property sale (a) and rental (b) price for shops and stores. Coefficient estimates are provided together with the 90% (black), 95% (gray), and 99% (light gray) confidence intervals. OLS, ordinary least squares; TWFE, two-way fixed effects.

contrast with de Chaisemartin and d’Haultfoeuille (2020), in which the control group is defined using all groups not-yet-treated at time t , Sun and Abraham (2021) use as the control group the never-treated groups or the groups treated last if there are no never-treated groups.²³ The Sun and Abraham (2021) estimator, called the “interaction-weighted” (IW) estimator, is based on three steps. First, using an interacted TWFE specification, which involves the inclusion of the interaction between relative time dummies D_{mt}^l and treatment-cohort indicators $1\{E_m = e\}$, they estimate each cohort average treatment effect ($CATT_{e,l}$). This first step in our empirical exercise takes the specification

$$Y_{mt} = \alpha_m + \mu_t + \sum_{e \in C} \sum_{l \neq -1} \varphi_{e,l} (1\{E_m = e\} * D_{mt}^l) + \varepsilon_{mt},$$

where m is a municipality; e identifies the “cohort” that is a set of municipalities first treated in a specific semester; l is a lead or lag relative to event time t . The expression $1\{E_m = e\}$ identifies the groups of cohort and captures if the time period (E_m) in which the municipality starts the treatment corresponds to a particular semester and if it is in the cohort e . D_{mt}^l is a time indicator referring to an observation related to a municipality m and l periods relative to the cohort when it was first treated. Lastly, α_m and μ_t are municipal and time fixed effects. In this setting, following Sun and Abraham (2021), as a reference period we use the period $t = -1$, corresponding to the origin for the event time.

The second step of the IW estimator requires the estimation of the weights $Pr\{E_m = e | E_m \in [-l, T - l]\}$, calculated as the sample share of each cohort in each relative period $l \in g$.

In the last step, the estimator takes a weighted average of estimates ($\varphi_{e,l}$) for $CATT_{e,l}$ from Step 1 with weight estimates ($Pr\{E_m = e | E_m \in [-l, T - l]\}$) from Step 2. These weights are then normalized by the size of g . This step can be formally written as follows:

$$\hat{v}_g = \frac{1}{|g|} \sum_{l \in g} \sum_e \hat{\varphi}_{e,l} \hat{Pr}\{E_m = e | E_m \in [-l, T - l]\}.$$

²³In our setting, we use the never-treated groups as the control group.

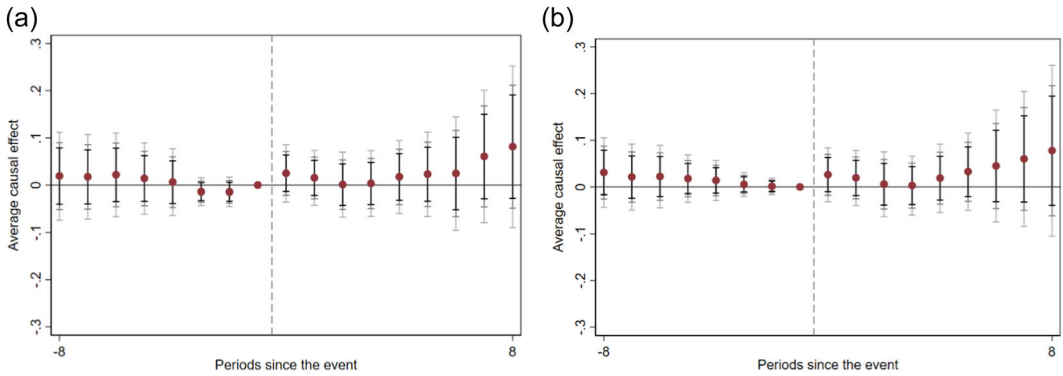


FIGURE 5 Event studies, using Sun and Abraham (2021) methodology. *Notes:* The panels show the event study results, implemented through the estimator developed by Sun and Abraham (2021). The dependent variables are the natural logarithm of the average commercial property sale (a) and rental (b) price for shops and stores. Coefficient estimates are provided together with the 90% (black), 95% (gray), and 99% (light gray) confidence intervals. OLS, ordinary least squares; TWFE, two-way fixed effects.

Overall, the results are in line with those based on the de Chaisemartin and d'Haultfoeuille method, although less statistically significant and with an upward dynamic effect starting after some periods from the treatment (see Figure 5). This further supports the presence of a common trend before the treatment and the absence of possible anticipatory effects due, for example, to the beginning of the judicial process and/or that of the confiscation procedure, which can even precede the reassignment event by several years.²⁴

7 | ROBUSTNESS CHECKS

7.1 | Population size

Although we find a significant effect of the reassignment policy on property prices in the municipality in which mafia firms used to operate, it is reasonable to assume that the impact may also depend on the relative extent of the antimafia measure. Unlike large municipalities (i.e., densely populated) where the removal of a mafia business may go unnoticed, in small municipalities, the bond between the local economy and mafia firms is likely to be inevitably stronger. Besides, the economic literature agrees on the major political and economic influence of the mafia in small- and medium-sized municipalities (see, above all, Dalla Chiesa, 2014; Ferrante, Fontana, et al., 2021). Indeed, we re-estimate our regressions on different samples of municipalities stratified by population size (<10,000, 10,000–50,000, and >50,000).

Our results (Table 2) show that the bigger the municipality, the lower the relative impact on commercial property prices, with the coefficient of the variable *Treated* not statistically different from zero in municipalities with more than 50,000 inhabitants. However, it must be noted that large municipalities as such represent less than 3% of

²⁴The reassignment of mafia firms comes at the end of a long judicial process (Caramazza, 2014), thus it can be considered a random event with respect to the time of policy enforcement. Unfortunately, detailed records on the judicial process and confiscation timing are not available. Moreover, sometimes seizure and confiscation orders may even be revoked. In any case, the absence of pretrends in every specification strengthens our identification strategy. We are thankful to the anonymous referee for stressing this point.

TABLE 2 Estimation results stratified by population size

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|--------------------------|-----------------------|---------------------|---------------------|----------------------|---------------------|---------------------|-----------------------|-----------------------|
| | <10,000 | <10,000 | 10,000–50,000 | 10,000–50,000 | >50,000 | >50,000 | <50,000 | <50,000 |
| | Sale | Rent | Sale | Rent | Sale | Rent | Sale | Rent |
| <i>Treated</i> | 0.0836*** (0.0314) | 0.0547* (0.0296) | 0.0488* (0.0256) | 0.0522** (0.0239) | −0.0571 (0.0363) | −0.0214 (0.0412) | 0.0631*** (0.0198) | 0.0483*** (0.0185) |
| Time FEs | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Municipality FEs | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 128,068 | 120,442 | 18,889 | 18,069 | 3637 | 3537 | 146,957 | 138,511 |
| Number of municipalities | 5797 | 5461 | 911 | 890 | 209 | 204 | 6708 | 6351 |
| R ² | 0.9365 | 0.9068 | 0.9336 | 0.9139 | 0.9373 | 0.9256 | 0.9422 | 0.9167 |

Notes: The dependent variables are the natural logarithm of the average commercial property sale and rental price for shops and stores. Standard errors (corrected for heteroskedasticity and clustered at the municipality level) are reported in parentheses. The symbols ***, **, and * indicate, respectively, that coefficients are statistically significant at the 1%, 5%, and 10% levels.

Abbreviation: FEs, fixed effects.

our sample. This is consistent with the fact that the Italian territory is made up of small- and medium-sized cities. And it is particularly in these smaller local contexts that the removal of mafia firms appears to be effective.

7.2 | Controlling for other antimafia measures

One major concern of our analysis is that the impact of organized crime on commercial price is underestimated since criminal organizations may still operate in the market using other techniques. For example, even without an active participation in legal markets, criminal organizations presence may still be detrimental to the local communities, particularly by means of extortion rackets. Moreover, another issue may be related to the fact that the removal of mafia firms occurred in the context of other efforts to combat the local mafia presence.

To check if our results are robust, we consider two additional antimafia policies. First, we use the legislative measure disposing of the dismissal of municipal councils when there is concrete, unambiguous, and relevant evidence that local bureaucrats are affiliated to or influenced by criminal organizations (Decree-Law 164/1991—then Law 221/1991—and Article 143 of the Consolidated Law of Local Authorities). More specifically, we exploit the enforcement of this policy as an additional exogenous shock that causes a variation in the presence of politically active criminal organizations. Therefore, we identify municipalities in which a dissolution has occurred, and we create a dummy (*Council Dissolution*) that takes value 1 from the starting period of the policy application. Table 3 shows the results. In columns (1) and (2) we replicate the estimates excluding municipalities that experienced a council dissolution, whereas in columns (3) and (4) we include in the regression the dummy for the dissolution. Then, in columns (5) and (6) we allow the interaction between the two dummy variables corresponding to dissolution and the reassignment policy. Overall, the results show a strong robustness that our findings are driven by economic factors and not by political ones (the coefficient of *Council Dissolution* is never statistically significant at any conventional level), in line with the main purpose of the confiscation and reassignment policies of weakening the economic power of the organization.

TABLE 3 Estimation results with the dissolution of local governments

| | (1) | (2) | (3) | (4) | (5) | (6) |
|--------------------------------------|-----------------------|----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| | Sale | Rent | Sale | Rent | Sale | Rent |
| <i>Treated</i> | 0.0568*** (0.0203) | 0.0487** (0.0193) | 0.0469*** (0.0178) | 0.0445*** (0.0168) | 0.0520*** (0.0188) | 0.0504*** (0.0180) |
| <i>Council Dissolution</i> | | | 0.0267 (0.0182) | -0.0073 (0.0229) | 0.0303 (0.0192) | -0.0031 (0.0232) |
| <i>Council Dissolution * Treated</i> | | | | | -0.0341 (0.0384) | -0.0398 (0.0425) |
| Time FEs | Yes | Yes | Yes | Yes | Yes | Yes |
| Municipality FEs | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 146,737 | 138,191 | 150,594 | 142,048 | 150,594 | 142,048 |
| Number of municipalities | 6726 | 6364 | 6917 | 6555 | 6917 | 6555 |
| R ² | 0.9430 | 0.9196 | 0.9431 | 0.9189 | 0.9431 | 0.9189 |

Notes: The dependent variables are the natural logarithm of the average commercial property sale and rental price for shops and stores. In columns (1) and (2) municipalities which experienced a council dissolution are removed from the sample. Standard errors (corrected for heteroskedasticity and clustered at the municipality level) are reported in parentheses. The symbols ***, **, and * indicate, respectively, that coefficients are statistically significant at the 1%, 5%, and 10% levels. Abbreviation: FEs, fixed effects.

Second, we consider the enforcement of administrative or penal procedures involving mafia assets (Law 646/1982 and Decree 159/2011).²⁵ We create a dummy (*Procedure*) that takes value 1 from the period in which the procedure is enforced at the municipal level.

We report our estimates in Table 4. Again, in columns (1) and (2) we use a subsample of observations that did not experience any procedure. Columns (3) and (4) include in the regression the dummy for the procedure, while columns (5) and (6) also consider the interaction between the dummy measuring the procedure and that accounting for the removal of mafia firms. Our results confirm that the removal of mafia-infiltrated businesses alone continues to be strongly associated with increasing rent and sale prices even when excluding the simultaneous enforcement of other antimafia policies, such as administrative or penal procedures. Despite *Procedure* shows a positive and significant coefficient on sale prices, our treatment variable overall still displays a large estimated impact of 3.6%, thereby corroborating our baseline estimate. We do not detect any joint effect of the two policies.

The overall results are consistent with the idea that the removal of mafia businesses is more impactful in hindering mafia power than other punitive sanctions toward individuals, such as the arrests and the conviction of mafia bosses and affiliated people (see Slutzky & Zeume, 2022).

7.3 | Intensity of the mafia presence

The proposed theoretical setting, according to which closing a mafia business modifies the local amenity stock, may imply different results depending on the preexisting mafia intensity presence in the territory. One may argue that if

²⁵We gather data from ANBC on *Immobili destinati* using the date of the beginning of the procedure.

TABLE 4 Estimation results with antimafia administrative or penal procedures

| | (1) | (2) | (3) | (4) | (5) | (6) |
|----------------------------|----------------------|---------------------|-----------------------|----------------------|-----------------------|---------------------|
| | Sale | Rent | Sale | Rent | Sale | Rent |
| <i>Treated</i> | 0.0694** (0.0288) | 0.0508* (0.0295) | 0.0360** (0.0179) | 0.0407** (0.0162) | 0.0596** (0.0257) | 0.0478* (0.0291) |
| <i>Procedure</i> | | | 0.0335*** (0.0078) | 0.0059 (0.0092) | 0.0350*** (0.0079) | 0.0064 (0.0093) |
| <i>Procedure * Treated</i> | | | | | -0.0356 (0.0289) | -0.0106 (0.0344) |
| Time FEs | Yes | Yes | Yes | Yes | Yes | Yes |
| Municipality FEs | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 135,400 | 127,574 | 144,441 | 136,243 | 144,441 | 136,243 |
| Number of municipalities | 6632 | 6273 | 6842 | 6482 | 6842 | 6482 |
| R ² | 0.9456 | 0.9290 | 0.9450 | 0.9284 | 0.9450 | 0.9284 |

Notes: The dependent variables are the natural logarithm of the average commercial property sale and rental price for shops and stores. In columns (1) and (2) municipalities which experienced an antimafia administrative or penal procedure are removed from the sample. Standard errors (corrected for heteroskedasticity and clustered at the municipality level) are reported in parentheses. The symbols ***, **, and * indicate, respectively, that coefficients are statistically significant at the 1%, 5%, and 10% levels.

Abbreviation: FEs, fixed effects.

the municipality registers a high level of mafia presence, the removal of a mafia business could be either a strong sign of hitting mafia interests that translates into lower disamenities, or on the contrary it could go unnoticed and hardly modify the local amenity stock. Hence, we exploit the index of organized crime intensity proposed by Calderoni (2011) to classify municipalities as mafia-ridden or not. More in detail, we consider a municipality as mafia-ridden if it is situated in a province lying in the third decile of Calderoni's (2011) ranking.

The results in Table 5 show that the policy has a more marked effect on municipalities included in mafia-ridden provinces, while it does not affect those located in not mafia-ridden areas.²⁶ These findings are in line with Ferrante, Fontana, et al. (2021), who find a positive impact of the reassignment of mafia assets on market competition exclusively in mafia-ridden contexts.

7.4 | Reaggregation by local labor market areas

Firms tend to have an influence on the local economic system that goes beyond city borders. This applies especially to mafia businesses by the power of their territorial control. Thus, to evaluate any potential spillover effects arising from the reassignment of mafia firms, instead of the municipality unit, we consider local labor market areas (*sistemi locali del lavoro*). According to Istat, the local labor market areas are supramunicipal geographical areas defined on the basis of daily commuting flows obtained from the Census. More specifically, we introduce a continuous variable that accounts for the share of reassigned firms over 10,000 inhabitants of each local labor market area (variable *Reassignment_LMA*). This variable also provides a measure of the intensity of the policy enforcement.

²⁶It must be also noted that less than 1% of the municipalities located in nonmafia provinces registered a policy enforcement.

TABLE 5 Estimation results according to the intensity of mafia presence

| | Mafia-ridden municipalities | | Other municipalities | |
|--------------------------|-----------------------------|-----------------------|----------------------|---------------------|
| | (1) | (2) | (3) | (4) |
| | Sale | Rent | Sale | Rent |
| <i>Treated</i> | 0.0364** (0.0187) | 0.0529*** (0.0186) | -0.0243 (0.0468) | -0.0214 (0.0334) |
| Time FEs | Yes | Yes | Yes | Yes |
| Municipality FEs | Yes | Yes | Yes | Yes |
| Observations | 43,632 | 43,329 | 106,962 | 98,719 |
| Number of municipalities | 2276 | 2268 | 4641 | 4287 |
| R ² | 0.9285 | 0.9069 | 0.9536 | 0.9275 |

Notes: The dependent variables are the natural logarithm of the average commercial property sale and rental price for shops and stores. The subsample of mafia-ridden municipalities includes those situated in a province lying in the third decile of Calderoni's (2011) mafia index. Standard errors (corrected for heteroskedasticity and clustered at the municipality level) are reported in parentheses. The symbols ***, **, and * indicate, respectively, that coefficients are statistically significant at the 1%, 5%, and 10% levels.

Abbreviation: FEs, fixed effects.

TABLE 6 Estimation results by local labor market areas

| | (1) | (2) |
|--------------------------|-----------------------|-----------------------|
| | Sale | Rent |
| <i>Reassignment_LMA</i> | 0.0938*** (0.0210) | 0.0811*** (0.0179) |
| Time FEs | Yes | Yes |
| Municipality FEs | Yes | Yes |
| Observations | 150,133 | 141,609 |
| Number of municipalities | 6850 | 6492 |
| R ² | 0.9440 | 0.9194 |

Notes: The dependent variables are the natural logarithm of the average commercial property sale and rental price for shops and stores. Standard errors (corrected for heteroskedasticity and clustered at the municipality level) are reported in parentheses. The symbols ***, **, and * indicate, respectively, that coefficients are statistically significant at the 1%, 5%, and 10% levels.

Abbreviations: FEs, fixed effects; LMA, labor market area.

Table 6 displays the results. Once again, the reassignment of mafia businesses leads to an increase in both sale and rental prices with the coefficient of *Reassigned_LMA* positive and statistically significant at the 1% level. This confirms that our previous findings are robust when taking into account the policy spillover influence on a larger economic area.

7.5 | Impact on other real estate categories

In our main analysis, we focus on the most representative category of commercial property assets, and specifically, we consider shops and stores prices as our dependent variable. However, to further validate our findings, we

extend the estimation to the other key commercial dwelling categories, that is, offices, laboratories, and warehouses. Moreover, we evaluate the impact of the policy on the household sector, since, in line with our theoretical framework, the removal of mafia firms may positively affect residential property values as well. More specifically, we use the sale and rental prices of civil houses in a normal state of conservation.

Results are shown in Table 7. The coefficient of *Treated* is positive for all dwelling types (both commercial and residential) and statistically significant at least at the 10% level, except for the sale price of houses. Similar to what we obtained for shops and stores, the treatment impact on offices—the second main typology of commercial properties—is around 4%. The coefficient of *Treated* is even higher for warehouses and laboratories, while the slighter effect on the household sector could be the result of a more indirect relationship between the eradication of mafia businesses and local amenity stock.

7.6 | Transmission mechanisms and effects on other outcomes

To further support our theoretical underpinnings, we test the demand-side factors that can drive our findings. We exploit two additional channels through which the enforcement of the policy may affect commercial property values. More specifically, we estimate Equation (1) by replacing the price of commercial properties either with the number of active firms or with the number of employees (both expressed in natural log) at the municipal level, provided by *Unioncamere-Infocamere*.

TABLE 7 Estimation results on other real estate categories

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|----------------------|---------------------|-----------------------|-----------------------|-----------------------|----------------------|--------------------|---------------------|
| | Offices | Offices | Laboratories | Laboratories | Warehouses | Warehouses | Houses | Houses |
| | Sale | Rent | Sale | Rent | Sale | Rent | Sale | Rent |
| <i>Treated</i> | 0.0428** (0.0209) | 0.0345* (0.0214) | 0.0953*** (0.0218) | 0.0944*** (0.0192) | 0.0600*** (0.0181) | 0.0513** (0.0241) | 0.0243 (0.0214) | 0.0622* (0.0372) |
| Time FEs | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Municipality FEs | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 124,435 | 117,011 | 98,992 | 94,849 | 108,000 | 103,678 | 150,296 | 140,815 |
| Number of municipalities | 5919 | 5607 | 4566 | 4443 | 4946 | 4799 | 7345 | 6982 |
| R ² | 0.9366 | 0.9324 | 0.9501 | 0.9229 | 0.9352 | 0.8937 | 0.9452 | 0.9406 |
| Mean of dependent variables | 6.7715 | 1.3449 | 6.1934 | 0.8551 | 6.0042 | 0.6457 | 6.8440 | 1.1995 |
| Standard deviation of dependent variables | 0.4247 | 0.4280 | 0.4424 | 0.4451 | 0.3929 | 0.4033 | 0.4523 | 0.4535 |

Notes: The dependent variables are the natural logarithm of the average property sale and rental price for several real estate categories. Standard errors (corrected for heteroskedasticity and clustered at the municipality level) are reported in parentheses. The symbols ***, **, and * indicate, respectively, that coefficients are statistically significant at the 1%, 5%, and 10% levels.

Abbreviation: FEs, fixed effects.

TABLE 8 Alternative transmission mechanism

| | (1) | (2) |
|---|-----------------------|-----------------------|
| | Active firms | Employees |
| <i>Treated</i> | 0.0505*** (0.0073) | 0.1571*** (0.0349) |
| Time FEs | Yes | Yes |
| Municipality FEs | Yes | Yes |
| Observations | 102,663 | 102,663 |
| Number of municipalities | 6933 | 6933 |
| R ² | 0.9969 | 0.9791 |
| Mean of dependent variables | 5.4317 | 6.1484 |
| Standard deviation of dependent variables | 1.3012 | 1.6242 |

Notes: The dependent variables are the natural logarithm of the number of active firms and that of firms' employees. Standard errors (corrected for heteroskedasticity and clustered at the municipality level) are reported in parentheses. The symbols ***, **, and * indicate, respectively, that coefficients are statistically significant at the 1%, 5%, and 10% levels. Abbreviation: FEs, fixed effects.

Consistently with Operti (2018), who finds that confiscation orders of organized crime's economic assets are positively associated with entrepreneurial entries at the provincial level, we expect the number of firms operating in the market to increase as a response to the reassignment of mafia firms. This growth, *ceteris paribus*, will translate into higher demand for business spaces and thus into higher prices and rents.

The confiscation measures against criminal organizations have also been proved to have spillover effects on their legal counterparts in terms of higher performance, turnover, and investments, as highlighted by F. Calamunci and Drago (2020). Thus, an increase in firms' demand for inputs may involve other factors of production. For this reason, we use the number of employees as a proxy for the labor force demand.

The results are shown in Table 8 and are consistent with our hypotheses. The removal of a mafia firm is positively correlated with both the number of active firms (coefficient equal to 0.0505 and statistically significant at the 1% level) and the number of firms' employees (coefficient equal to 0.1571 and statistically significant at the 1% level).

Moreover, since the scale of our estimated impact of the removal of mafia business is considerable, we expect the effects could be visible elsewhere in the economy. Thus, we provide additional estimates for other outcomes. First, we use the natural logarithm of the average income earned by entrepreneurs at the municipal level (*Income entrepreneurs*) as an indicator of the development of the private sector.²⁷

Second, we proxy the quality of the public sector by the Institutional Quality Index (IQI) provided by Nifo and Vecchione (2014). This is a composite measure including the following five pillars: government effectiveness, regulatory quality, rule of law, voice and accountability, and corruption.

Third, we use the natural logarithm of the number of crimes which potentially signal the danger of mafia infiltration (*Crimes signaling mafia*) reported to the Judicial authorities by the State Police, Carabinieri, and Guardia di Finanza (Mocetti & Rizzica, 2021).²⁸ Unfortunately, we were unable to find more granular data for the latter two

²⁷These yearly data are gathered from Istat and are available from 2012 to 2019.

²⁸Among these crimes, we consider attacks, robberies, extortions, usury, criminal association, mafia criminal association, money laundering, arson, damage followed by arson, trafficking and drug possession, exploitation and abetting prostitution, and smuggling.

TABLE 9 Effects on other outcomes

| | (1) | (2) | (3) |
|---|----------------------|----------------------|------------------------|
| | Income entrepreneurs | IQI | Crimes signaling mafia |
| <i>Treated</i> | 0.0239** (0.0094) | 0.0292** (0.0137) | -0.0701* (0.0413) |
| Time FEs | Yes | Yes | Yes |
| Municipality/provincial FEs | Yes | Yes | Yes |
| Observations | 31,566 | 970 | 970 |
| Number of municipalities/provinces | 5757 | 97 | 97 |
| R ² | 0.9969 | 0.9791 | 0.9038 |
| Mean of dependent variables | 9.8055 | 0.5824 | 2.7476 |
| Standard deviation of dependent variables | 0.3163 | 0.2518 | 0.4010 |

Notes: The dependent variables are the natural logarithm of the average income earned by entrepreneurs at the municipal level (1), the Institution Quality Index (IQI) by Nifo and Vecchione (2014) at the provincial level (2), and the natural logarithm of the number of crimes signaling mafia infiltration at the provincial level (3). Standard errors (corrected for heteroskedasticity and clustered at the municipality/province level) are reported in parentheses. The symbols ***, **, and * indicate, respectively, that coefficients are statistically significant at the 1%, 5%, and 10% levels.

Abbreviation: FEs, fixed effects.

outcomes, which are available at the provincial level. To account for this limitation, we use as a treatment variable the share of reassigned firms per 10,000 inhabitants at the provincial level.²⁹

The results in Table 9 show that, consistently with our baseline findings and preliminary conjectures, the removal of mafia firms is associated with an increase of 2.4% in the average income earned by entrepreneurs. The share of reassigned mafia firms is positively correlated with a growth in the IQI and a decrease in the number of crimes signaling mafia infiltration (the coefficients are, respectively, equal to 0.029 and -0.070, and statistically significant at the 5% and 10% levels).

8 | CONCLUSIONS

Several policies aiming at eradicating organized crime have been implemented over the last decades and particularly those targeting the incomes and assets of mafia-type groups. This paper investigates whether the enforcement of the reallocation of mafia-infiltrated firms has had an impact on commercial property values prices between 2002 and 2019 in Italian municipalities. We find a significant and robust increase in rental and sale prices in response to the removal of mafia firms of about 4%. The impact is detected only in small to medium municipalities and in mafia-infested contexts, where the latent disamenity due to organized crime infiltration is prominent. To the best of our knowledge, no other work links the removal of mafia businesses to commercial real estate prices. The present paper represents the first attempt in this direction, and as such, it may benefit from further investigation.

We acknowledge the limitations of our work. The lack of granular data on commercial dwellings characteristics prevents us from using the traditional hedonic price technique and forces us to resort to average property values. Nonetheless, we test the robustness of our results to several alternative specifications. Moreover, we focus on the

²⁹The estimates with provincial data use yearly observations covering the period 2010–2019.

first policy treatment and do not consider the effect of multiple reassignment orders within the same municipality over time. However, if the first “treated” firm is a small and irrelevant business and the big mafia businesses are removed only later on, the true effect of the treatment on the property values might be biased. The unavailability of data on firms' size does not allow us to investigate whether the treatment on the property values depends on the economic relevance of the closed mafia business. Still, we provide a continuous supramunicipal measure of the intensity of treatment that corroborates the positive impact of the policy enforcement. An interesting point may be to expand this issue using a continuous treatment approach.

We study the response of commercial property values, yet the beneficial effects of the removal of mafia firms may not directly involve this economic variable. Nowadays, physical business spaces are becoming dispensable to many entrepreneurial activities. Future research may account for spillover effects on other economic outcomes, as well as other possible transmission mechanisms. Either way, the overall impact of the policy would be underestimated, and the implication of our analysis would not change substantially. Lastly, we do not directly observe the potential response of the mafia, which might reorganize and find new ways to pursue its economic interests thanks to its widespread yet concealed infiltration in the socioeconomic fabric. It would be interesting to assess the outcome of the policy to additional measures of the presence of mafia-type organizations.

Our work represents an advance toward a deeper understanding of the impact of organized crime on the economy and the antimafia policy assessment. Policy implications are straightforward and suggest that antimafia measures turn out to be effective when they hit the core of organized crime activities, that is, their economic interests. However, the fact that a considerable percentage of the firms ends up being either foreclosed or sold at the end of the judicial process signals difficulties in the management of former mafia businesses and their reconversion into legitimate enterprises (see Cabras & Meli, 2017; F. M. Calamunci, 2022 for details). This casts some doubts on the thorough effectiveness of the reassignment policy insofar as it leads to a wasted potential in terms of production and employment opportunities. And it highlights the need to revise the regulatory framework on management and reconversion of criminal assets. In this instance, various motions have been advanced over time at the national level (Commissione Antimafia ARS, 2021), and recently the use of Recovery and Resilience Plans funds has been proposed as a source to finance a more efficient implementation of the reassignment process and enhance properties and productive criminal management. Still, our findings support the effectiveness of the policy despite its unlocked potential, and an eventual improvement could only bring about a more prominent impact. The increase in the number of confiscation and reassignment orders in Italy in the last decade represents a step in this direction. Moreover, despite we focus on the Italian context, the infiltration of a criminal organization in the economy is a widespread phenomenon all over the world. Its eradication is at the forefront of the international policy agenda, and research contributions that evaluate possible antimafia measures may meaningfully inform the course of action.

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DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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